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### MLRS AMMUNITION MOVEMENT IN TRANSPORTATION SYSTEM

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## **ABSTRACT**

### **MLRS AMMUNITION MOVEMENT IN TRANSPORTATION SYSTEM**

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This report details the process and results of the analysis of MPT requirements to transport multiple launch rocket system (MLRS) ammunition within the confines of the current transportation system. The impacts of PLS, 5 ton tractors with M871 trailer, and HEMTT with HEMAT, on vehicle operators and maintainers from the corps support area (CSA) to the ammunition transfer point (ATP) will be studied.

This report contains two sections. The first section explained the analytical process, followed by the analysis results, detailed in the second section. The following summary provides general results:

- Greatest increase of manpower over the base case PLS configuration is at the medium truck company (5 ton) level.
- There is a slight increase of manpower requirements for the HEMTT.

## **SECTION 1.0**

### **MLRS AMMUNITION MOVEMENT IN TRANSPORTATION SYSTEM ANALYTICAL PROCESS**

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#### **1.1 INTRODUCTION**

This section describes the data sources, analytical process, and methodology used in the manpower analysis. An overview of the model used for determining the manpower requirements detailed in Section 2.0 of this report, is included.

#### **1.2 BACKGROUND**

This analysis is part of a tasking set forth by HQDA in Message HQDA, DAMO-FDL, 081209Z Apr. 94, subj.: Review of Field Artillery (FA) Support Unit Design and Transport of Multiple Launch Rocket System (MLRS) Rocket Pods in the Transportation System. This is an HQDA tasker requesting TRADOC develop an action plan to review:

- The unit design of Standard Requirements Codes (SRC's) for Field Artillery (FA) units and,
- Determine the most cost and/or operationally effective method to transport Multiple Launch Rocket System (MLRS) ammunition within the bounds of a general ammunition distribution system.

Lead agencies include the U.S. Army Field Artillery School (USAFA); the U.S. Army Combined Arms Command (USACAC); the U.S. Army Combined Arms Support Command (CASCOM); the U.S. Army TRADOC Analysis Center, Ft. Lee (TRAC-LEE).

TRAC-LEE assumed the lead for the operational and cost portion of the review, reference section 2.C of the message. As directed by HQDA, the analysis is to include, as a minimum, comparison of the Palletized Load System (PLS); Heavy Expanded Mobility Tactical Truck (HEMTT) used in a transportation unit mode; and five-ton tractors (medium tactical vehicle) with M871 semitrailers in corps and division areas. AEPCO prepared the manpower analysis portion of this tasker.

#### **1.3 DATA SOURCES**

Several data sources were found to complete the manpower analysis of this tasker. These sources were primarily government furnished information (GFI) and Army regulations (ARs). GFI included tables of organization and equipment (TOEs) for the PLS and 5 ton tractor and related trailer, briefing material and oral guidance.

##### **1.3.1 TOEs AND ORAL GUIDANCE**

TOEs were useful in the analysis to establish transportation company configurations.

Each PLS transportation company (SRC 55728L300) contained forty-eight vehicles. Since there was no HEMTT company in existence, a HEMTT notional unit, patterned after the PLS company, was created. The medium truck company (SRC 55728L100) contained sixty 5 ton tractors. Since the Army would not reconfigure these units with fewer vehicles, the analysis used the sixty vehicle company for the 5 ton tractor alternative. The analysis assumed that there was one trailer for each vehicle. Under the analysis, these transportation units hauled MLRS and were considered company "equivalents" (normally transportation units carry more than MLRS ammunition).

Oral guidance included study assumptions/constraints, which TRADOC requested that the HQDA POC review and approve, detailing the basis of the analysis. AEPCO was to calculate manpower requirements for the various systems. Manpower requirements (operators and maintainers) were to be expressed in terms of numbers of soldiers.

### 1.3.2 ARs

Operator requirements were based on guidance from AR 570-2 Manpower Requirements Criteria (MARC). The military occupational specialty 88M was chosen as the primary driver for the tractors. A query on line item numbers (LINs) in the Army MARC Maintenance Data Base (AMMDB) provided maintenance ratios broken out by military occupational specialties (MOSs). Once operator and maintainer manpower levels were determined, standards of grade authorization (SGA) tables (from the Military Occupational Classification and Structure update) were used to determine required soldier skill levels and dispersion.

## 1.4 ANALYTICAL PROCESS

The analytical process and the methodology are often not easily distinguishable from each other. For this report, the analytical process consists of the steps followed in conducting the analysis. The methodology consists of the analytical tools used in deciding manpower requirements. In this section, the analytical process and technical approach will be described.

AEPCO reviewed the HQDA message to determine the TRAC-LEE requirements. AEPCO then prepared a briefing on the tasking and met with other TRADOC elements via video teleconference (VTC) to ensure understanding of the requirements in the DA tasker. TOEs were reviewed for existing manpower requirements in the target MOSs. Documentation was analyzed to determine any applicable manpower or vehicle factors.

With this basic understanding in place, AEPCO analysis reviewed other MPT and logistics analyses for utility in addressing the issues identified and providing the information required by tasks set forth in the tasker. Subject matter experts (SMEs) were consulted from CASCOM and the transportation school, and their guidance incorporated into the analysis.

Once these reviews were completed and issues were known, the team narrowed their efforts to specific documentation. Analysis priorities were then established based on the importance of the issue(s) that the analysis will answer. These agreements were reached at a methodology and assumptions planning meeting, which was held at CASCOM headquarters.

After the Government provided response and comments to the initial findings presented at the VTC, AEPCO analysts updated the analysis accordingly. Figure 1-1 provides a process flow-type overview of this delivery order's technical approach.

## 1.5 METHODOLOGY

This section discussed the development of the models used in the analysis of MLRS movement using line haul transportation companies. The models used algorithms sanctioned by AR 570-2 and were written in Microsoft Excel version 4.0 software. HARDMAN comparative methodology (HCM) formed the basis of the analysis.

### 1.5.1 BACKGROUND SPREADSHEETS

Two background spreadsheets were developed for the MLRS study. The first background spreadsheet lists the combination of vehicle and trailer (PLS transporter and trailer, 5 ton tractors and 22 1/2 ton M871 trailer, HEMTT with 11 ton HEMAT) broken out by SRC and LIN. Maintenance positions required (MPR) was calculated using factors obtained from the MARC database. The MPR was then multiplied by the number of tractor/trailer combinations contained in the unit type, and the results rounded and segregated by the military occupational specialty. A second background spreadsheet determined the skill level mix as authorized by the SGA.

### 1.5.2 SUMMARY SPREADSHEET

A summary spreadsheet was developed for the base case PLS versus the 5 ton tractors and 22 1/2 ton M871 trailer (alternative 1), and HEMTT with 11 ton HEMAT (alternative 2). These spreadsheets detail the results of the computations used to determine the manpower impacts of replacing the base case vehicles with the 5 ton/HEMTT system by MOS. Manpower requirements and the associated differences between the base case and alternatives were provided on a unit basis. Each PLS/HEMTT transportation company equivalent (based on SRC 55728L300) contained forty-eight vehicles. The medium truck company using the 5 ton tractors with an M871 trailer (SRC 55728L100) contained sixty vehicles. In each transportation company, there were equal numbers of trailers and tractor vehicles.

## **SECTION 2.0**

### **MLRS AMMUNITION MOVEMENT IN TRANSPORTATION SYSTEM MANPOWER ANALYSIS RESULTS**

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#### **2.1 INTRODUCTION**

This section describes the methodology used to conduct the MLRS ammunition transportation study and the results of the analyses. The issue AEPCO was tasked to address was:

- The direct productive manpower requirements (operators and maintainers) that will be required to transport MLRS ammunition from the corps support area (CSA) to the ammunition transfer point (ATP).
- Manpower requirements will be expressed in terms of numbers of soldiers.

#### **2.2 METHODOLOGY**

This analysis divided manpower requirements into the following levels: transportation company/unit (vehicle operators and maintainers), direct support and general support maintainers. These levels were then divided into unit types, i.e., medium truck company (SRC 55728L100) for the 5 ton, and medium truck company PLS (SRC 55728L300) for the PLS and HEMTT. Since there are no HEMTT companies in existence, a HEMTT notional unit, patterned after the medium truck company PLS, will be used. MOS quantities were determined using approved MARC data. These figures were multiplied by the total number of vehicles per unit to arrive at total requirements. The respective manpower results are listed in Table 2-1.

#### **2.3 ANALYSIS**

Table 2-1 depicts the manpower requirements for the PLS transporter and trailer, 5 ton tractors and 22 1/2 ton M871 trailer, and HEMTT with 11 ton HEMAT. These requirements were broken down into base case (PLS), alternative 1 (5 ton) and alternative 2 (HEMTT). These unit types were further pared by MOS, and include the 88M (motor transport Operator), 63B (light-wheel vehicle mechanic), 63S (heavy-wheel vehicle mechanic), and 63W (wheel vehicle repairer).

The base case required 104 system specific operators and maintainers. Since there were forty-eight vehicles in each unit equivalent, ninety-six vehicle operators were required. The unit is considered operational twenty-four hours per day. In line haul operations, one truck makes two round trips per twenty-four hour period. Each trip consists of hauling a loaded trailer to a TTP, unhitching the loaded trailer, hitching an empty trailer, and returning to the company area. One operator will make one round trip per twelve hour shift. Since there will be two shifts per twenty-four hour period, each truck will require two operators (refer to AR 570-2 for operator requirements doctrine). Five 63S unit maintainers were required for system specific maintenance.

TABLE 2-1

## MANPOWER COMPARISON

	BASE - PLS (48 Tractors/Trailers)	ALT 1 - FIVE TON (60 Tractors/Trailers)	DELTA BASE VS. ALT 1	ALT 2 - HEMTT (48 Tractors/Trailers)	DELTA BASE VS. ALT 2
<b>PRINCIPLE OPERATORS</b>					
68M30 - SSG	9	12	3	9	
68M20 - SGT	36	48	10	36	
68M10 - SPC	49	60	11	49	
<b>PRINCIPLE MAINTAINERS</b>					
UNIT					
63830 - SSG		1	1		
63820 - SGT		3	3		
63810 - SPC		3	3		
63810 - PFC		3	3		
63S20 - SGT	1	1	1		
63S10 - SPC	1	1	1		
63S10 - PFC	3	2	(1)	5	2
<b>DIRECT SUPPORT MAINTENANCE (DS)</b>					
63W20 - SGT		1	1	1	1
63W10 - SPC		1	1	1	1
63W10 - PFC		1	1	1	1
<b>GENERAL SUPPORT MAINTENANCE (GS)</b>					
63W20 - SGT			1		
63W10 - SPC	1		1		1
63W10 - PFC	1		1	1	1
<b>GRAND TOTAL</b>	<b>104</b>	<b>140</b>	<b>36</b>	<b>108</b>	<b>4</b>

Three 63Ws were required for DS and GS maintenance.

Alternative 1 (5 ton tractors with M871 trailer) required 140 system specific operators and maintainers. Since there were sixty vehicles in each unit equivalent, 120 vehicle operators were required. The medium truck company (SRC 55728L100) contained sixty 5 ton tractors and since the Army will not reconfigure these units with fewer vehicles, the analysis used the sixty vehicle company type for the 5 ton tractor alternative. If the medium truck company were allowed to be configured with forty-eight vehicles, there would obviously be manpower savings on a per transportation unit equivalent basis. Also, since each combination of vehicle and trailer can carry eight MLRS rocket pods, the issue is not how many pods each can carry, but the efficiency and effectiveness of transporting these pods and how many transportation unit equivalents will be required. Based on the sixty vehicle constraints, fourteen 63B/63S maintainers will be required, and three maintainers each for DS and GS maintenance will be required. This alternative increased the direct system specific manpower requirements by thirty-six, over the base case system. Since MHE from another unit must load or unload MLRS ammunition from the M871 trailer, non-organic MHE operation and maintenance was omitted from this analysis. MHE built into the PLS and HEMTT was factored into their maintenance requirements.

Alternative 2 comprised the HEMTT with 11 ton HEMAT. The HEMTT required the same number of operators as PLS, both at ninety-six. There was an increase of four positions over the base case for this alternative, 108 in all. Unit maintenance increased by two; DS maintenance increased by one, GS maintenance increased by one.

#### 2.4 FINDINGS

There was an increase in manpower requirements for each alternative. Maintenance requirements increased for alternative 2 (HEMTT) over the base case by four positions. Alternative 1 provided an increase of thirty-six positions over the base case, primarily due to the increased number of vehicles required by doctrine. If the 5 ton unit could be reduced to forty-eight vehicles (equivalent to the other systems), the total requirements would be reduced to 112 positions, an increase of eight positions over the base case.